

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-2 (canceled)

3. (currently amended): A system for detecting motion of a wireless device₁ ~~operating within a wireless network~~, comprising:

a first ~~network~~ wireless device configured for communicating wirelessly with at least a second ~~network~~ wireless device;

at least one of said wireless devices configured as a beacon sender for sending beacon frames containing signal strength information;

at least one of said wireless devices configured as a beacon receiver for receiving said beacon frames;

a computer processor associated with one of said wireless devices and configured for processing said signal strength information; and

with programming executable on said computer processor for performing acts comprising:

~~communicating beacon frames containing signal strength information between said first network device and the second network device;~~

calculating, from said signal strength information, differences in signal strength for a plurality of signal strength samples accumulated during a sampling period;

performing a signal strength regression analysis on received said differences in signal strength information with respect to the number of samples in said plurality of signal strength samples[.];

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

calculating, as a result of said regression analysis, a coefficient of determination;

calculating, as a result of said regression analysis, a regression coefficient; and

generating and outputting a proximity motion detection signal in response to determining that the regression coefficient is approximately equal to or greater than the quotient of (i) change in signal strength from start to end of the sampling period divided by (ii) the number of said plurality of signal strength samples, and further in response to determining that the coefficient of determination exceeds a threshold value. ~~said signal strength regression analysis performed during close-proximity relative motion between said first network device and said second network device within a given time interval.~~

4. (currently amended): A system as recited in claim 3, wherein said regression analysis is performed without regard to transmit power of the ~~first network device~~ wireless devices.

5. (currently amended): A system as recited in claim 3, wherein said beacon ~~frame is an~~ frames comprise IEEE 802.11 network formatted data frame frames.

6. (currently amended): A system as recited in claim 3~~[[,]]~~:
wherein said computer processor and said programming are associated with said beacon receiver.

~~wherein said programming is configured for transmitting beacon frames from said first network device acting as a sending wireless device for receipt by ~~[[the]]~~ said second network device acting as a receiving wireless device, or from said second network device acting as a sending wireless device for receipt by said first network device acting as a receiving wireless device.~~

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

7. (currently amended): A system as recited in claim 3:
wherein said computer processor and said programming are associated with
said beacon sender; and

wherein said beacon receiver is configured to send said signal strength
information to said beacon sender for processing.

~~wherein said programming is configured for accumulating a plurality of signal~~
~~strength measurements for said regression analysis.~~

8. (currently amended): A system as recited in claim ~~[[6]]~~ 3, wherein said
~~programming continuously monitors beacon frames~~ are transmitted by the ~~sending~~
~~wireless device to the receiving wireless device~~ beacon sender at a predetermined
transmission interval.

9. (previously presented): A system as recited in claim 8, wherein said
predetermined transmission interval is at or less than approximately 100 milliseconds.

10. (currently amended): A system as recited in claim ~~[[6]]~~ 3, wherein said
programming ~~tunes~~ further carries out the act of tuning an interval frequency for
transmitting the beacon frames, ~~between the receiving wireless device and the sending~~
~~wireless device.~~

11. (previously presented): A system as recited in claim 3, wherein said
programming is configured to detect motion in response to a defined signal strength
change within the given time interval.

12. (previously presented): A system as recited in claim 11, wherein motion is
detected if said signal strength change of approximately 20 dB arises within less than or
equal to a time interval of approximately one second.

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

13. (currently amended): A system as recited in claim 3, wherein ~~said programming is configured for calculating a regression coefficient of the difference in the signal strength in response to accumulating a plurality of signal strength measurements~~ proximity motion occurs when said first wireless device moves toward said second wireless device to within less than or equal to approximately 15 centimeters.

14. (currently amended): A system as recited in claim 3, wherein ~~the signal strength regression analysis programming is configured to calculate a coefficient of determination in the signal strength for a plurality of accumulated signal strength measurements~~ proximity motion occurs when said first wireless device moves toward said second wireless device to within less than or equal to approximately 5 centimeters.

15. (currently amended): A system as recited in claim 14:
wherein proximity motion occurs when said first wireless device moves toward said second wireless device from a distance equal to or greater than approximately 30 centimeters to less or equal to approximately 15 centimeters. ~~said programming is configured for calculating a regression coefficient of the difference in the signal strength; and~~

~~wherein said proximity motion is detected in response to determining that the regression coefficient is approximately equal to the quotient of the increase in the signal strength divided by the accumulated signal strengths and the coefficient of determination.~~

Claims 16-17 (canceled)

18. (currently amended): A method of detecting motion between a first wireless device ~~at a fixed location~~ and a second wireless device, ~~that is mobile~~, comprising:

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

~~continuously monitoring the strength of signals~~ signal strength information for a signal transmitted between said first wireless device and said second wireless device;
~~as a mobile device that is configured for moving toward said first wireless device;~~

calculating, from said signal strength information, differences in signal strength for a plurality of signal strength samples accumulated during a sampling period;

~~regressively analyzing said monitored signal strength~~ performing a regression analysis on said differences in signal strength with respect to the number of samples in said plurality of signal strength samples;

calculating, as a result from said regression analysis, a regression coefficient;

calculating, as a result from said regression analysis, a coefficient of determination; and

~~detecting proximity motion of said second wireless device with respect to said first wireless device in response to said regression analysis performed over a given time interval.~~ generating and outputting a proximity motion detection signal in response to determining that the regression coefficient is approximately equal to or greater than the quotient of (i) change in signal strength from start to end of the sampling period divided by (ii) the number of said plurality of signal strength samples, and further in response to determining that the coefficient of determination exceeds a threshold value.

19. (currently amended): A method as recited in claim 18, wherein ~~the proximity range is~~ proximity motion occurs when said first wireless device moves toward said second wireless device to within less than or equal to approximately 15 centimeters.

20. (currently amended): A method as recited in claim 18, wherein ~~the proximity range is~~ proximity motion occurs when said first wireless device moves toward said second wireless device to within less than or equal to approximately 5 centimeters.

21. (canceled)

22. (currently amended): A method as recited in claim 18;
wherein at least one of said wireless devices is configured as a beacon sender
for sending beacon frames containing signal strength information; and
wherein at least one of said wireless devices is configured as a beacon receiver
for receiving said beacon frames.

~~wherein either said first wireless device or said second wireless device is~~
~~configured for sending or receiving beacon frames as said first wireless device and said~~
~~second wireless device communicate with one another.~~

23. (currently amended): A method as recited in claim 18, wherein proximity
motion is detected in response as ~~said second wireless device is maneuvered towards~~
~~said first wireless device, wherein the distance between said first wireless device and~~
~~said second wireless device is reduced from~~ occurs when said first wireless device
moves toward said second wireless device from a distance equal to or greater than
approximately 30 centimeters to less or equal to approximately 15 centimeters.

24. (currently amended): A method as recited in claim 18:
wherein said regression analysis is performed without regard to transmit power
of the wireless devices. ~~said signal strength of beacon frames is continuously~~
~~monitored to accumulate a plurality of signal strength measurements; and~~
~~wherein regression analysis is performed as a function of time on accumulated~~
~~signal strength measurements at a receiving device of either said first wireless device or~~
~~said second wireless device to determine if the two wireless devices are in proximity~~
~~motion in relation to one another.~~

25. (currently amended): A method as recited in claim ~~[[24]]~~ 22, wherein said
beacon frames comprise IEEE 802.11 network formatted data frames. ~~said regressively~~
~~analyzing said monitored signal strength further comprises calculating a difference~~

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

~~between the strength of the signal at a designated time with respect to a time prior to the designated time to determine the strength of the signal as said second wireless device approaches said first wireless device.~~

26. (currently amended): A method as recited in claim ~~[[25]]~~ 22, wherein said beacon receiver is configured for processing said signal strength information.
~~regressively analyzing said monitored signal strength further comprises linearly analyzing a difference in signal strength for said accumulated signal strength information with respect to the number of sample signals within the accumulated signal strength information over a period of time.~~

27. (currently amended): A method as recited in claim ~~[[26]]~~ 22:
wherein said beacon sender is configured for processing said signal strength information; and
wherein said beacon receiver is configured to send said signal strength information to said beacon sender for processing. ~~further comprising calculating a regression coefficient of the difference in the signal strength of said accumulated signal strength information.~~

28. (currently amended): A method as recited in claim ~~[[27]]~~ 22, wherein said beacon frames are sent by the beacon sender at a predetermined transmission interval.
~~further comprising calculating a coefficient of determination of the difference in the signal strength for the accumulated signal strength information.~~

29. (currently amended): A method as recited in claim 28, wherein said predetermined transmission interval is at or less than approximately 100 milliseconds.
~~further comprising calculating an increase in the signal strength from the start to the end of a proximity motion by said second wireless device.~~

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

30. (currently amended): A method as recited in claim ~~29~~, wherein 22, further comprising tuning an interval frequency for sending the beacon frames. proximity-
motion of said second wireless device is detected in response to the regression-
coefficient being found approximately equal to the quotient of the increase in the signal-
strength divided by the accumulated signal strength information.

31. (currently amended): A method as recited in claim ~~29~~, wherein further
comprising detecting motion in response to a defined signal strength change within the
given time interval.

~~said proximity motion of said second wireless device is detected in response to~~
~~the coefficient of determination exceeding the regression coefficient.~~

32. (currently amended): A method as recited in claim ~~[[27]]~~ 31, wherein motion
is detected if said signal strength change of approximately 20 dB arises within less than
or equal to a time interval of approximately one second. the increase in the signal-
strength is pre-calibrated prior to performing the regression analysis on the-
accumulated signal strength information.

33. (currently amended): A method of detecting motion between a first wireless
node and a second wireless node, comprising:

continuously monitoring beacon frames transmitted by said second wireless
node to said first wireless node;

recording accumulating signal strength information contained in the beacon
frames transmitted by said second wireless node;

~~retaining accumulated signal strength information in said first wireless node; and~~

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

calculating, from said accumulated signal strength information, differences in signal strength for a plurality of signal strength samples accumulated during a sampling period;

~~regressively analyzing the accumulated signal strength information within a given time interval to determine if proximity motion of said second wireless node with respect to said first wireless node has occurred~~ performing a regression analysis on said differences in signal strength with respect to the number of samples in said plurality of signal strength samples;

calculating, as a result of said regression analysis, a coefficient of determination;

calculating, as a result of said regression analysis, a regression coefficient; and

generating and outputting a proximity motion detection signal in response to determining that the regression coefficient is approximately equal to or greater than the quotient of (i) change in signal strength from start to end of the sampling period divided by (ii) the number of said plurality of signal strength samples, and further in response to determining that the coefficient of determination exceeds a threshold value.

Claims 34-37 (canceled)

38. (currently amended): A method as recited in claim 37, wherein ~~proximity motion is detected in response to said regression coefficient of~~ the threshold value for the coefficient of determination is approximately 0.70.

39. (currently amended): A method as recited in claim 37, wherein ~~proximity motion is detected in response to said regression coefficient of~~ the threshold value for the coefficient of determination is approximately 0.75.

Claims 40-41 (canceled)

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

42. (currently amended): A method of detecting motion ~~in~~ of a mobile wireless device with respect to a stationary wireless device in a wireless network, the method comprising:

calculating signal strength ~~difference~~ differences between the mobile wireless device and the stationary wireless device as the mobile wireless device approaches the stationary wireless device for a plurality of samples;

~~regressively analyzing~~ performing a regression analysis on said signal strength differences during a signal sampling period with respect to said plurality of samples;

calculating, from said regression analysis, a coefficient of determination,

calculating, from said regression analysis, a regression coefficient; and

~~determining, based on the regressively analyzing, whether~~ that the mobile wireless device has moved into proximity with the stationary wireless device ~~within a given period of time or number of signal strength samples~~ and outputting a proximity motion detection signal in response to determining that the regression coefficient is approximately equal to or greater than the quotient of (i) change in signal strength from start to end of the sampling period divided by (ii) the number of said plurality of signal strength samples, and further in response to determining that the coefficient of determination exceeds a threshold value.

43. (currently amended): A method as recited in claim 42, wherein the stationary wireless device and the mobile wireless device are configured in IBSS mode ~~with one of the fixed wireless device and~~ wherein the mobile wireless device ~~being~~ is configured as an access point node.

44. (previously presented): A method as recited in claim 42, wherein calculating the signal strength difference between the mobile wireless device and the fixed wireless device is performed with respect to accumulated signal strength information within a plurality of recorded signal strength samples.

Appl. No.: 10/814,419
Amdt. Dated: 08/17/2006
Off. Act. Dated: 05/17/2006

45. (currently amended): A method as recited in claim 44, wherein said ~~regressively analyzing~~ regression analysis comprises performing a linear regression analysis on the difference in signal strengths on the signals transmitted between the mobile wireless device and the fixed wireless device with respect to the number of samples to determine ~~[[a]]~~ said regression coefficient of the signal strengths.

46. (currently amended): A method as recited in claim 45, wherein said ~~regressively analyzing~~ regression analysis comprises performing a linear regression analysis on the difference in signal strengths on the signals transmitted between the mobile wireless device and the fixed wireless device with respect to the number of samples to determine ~~[[a]]~~ said coefficient of determination of the signal strength.

47. (canceled)

48. (currently amended): A method as recited in claim ~~[[47]]~~ 42, wherein the threshold value for the coefficient of determination is approximately 0.70.

49. (currently amended): A method as recited in claim ~~[[47]]~~ 42, wherein the threshold value for the coefficient of determination is approximately 0.75.